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Deformation of bone under loading in implants and natural teeth; Biomechanics of strains in bone remodeling

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Aim of Study: Compare the deformation in bone after loading a tooth and implants axially. Since strain deformation in strains is a key parameter for physiologic bone modeling. The comparison through mechanical values will give us an idea how strong the stress/stress distribution is reach to bone to trigger normal or abnormal input. These results are extremely import to address any gap and rearranged the biophysical approach in the design of implant used in medicine.

Method: Analysis of several finite element analyses in the field of biomechanics of stress/ distribution in implants compare to a natural tooth. The computational FEA are lately used to predict loading, stress and strain y the field of medicine with very positive approximation results. The comparison is made between single posterior implant and a natural single molar and the computation mapping strains in the cancellous, cortical bone of the components and their proportional relation.

Results: The deformation in cortical bone and cancellous bone comparison in strains and computational FEA in implants and natural tooth is in the range for 5-10(5,000-9,000 us) more in implants.

Discussion: The FEA is a computation analysis of approximation of loads in stress/strain in the bone for our purpose of study. This analysis was widely used with isotropic material, but lately it is used also for orthotropic or simplified orthotropic and transversely isotropic models for the best approximation results. The misfit in deformation is high 5-10 comparison metal implants to a natural human organ. This may trigger bone modelling reabsorption that will lead to failure according to the values of Wolff and Frost (1,000 us).

Conclusion: Five to 10 times more strain deformation is reach in bone by metal implant compare to a natural human organ(tooth). More scientific investigation is needed to decrease this huge gap

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